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UNIVERSAL HIGH-SCHOOL TRAINING IN ILLINOIS AS AN OBJECTIVE

BY

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THESIS

Submitted in Partial Fulfillment of the Requirements for the

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THE GRADUATE SCHOOL

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I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY Charles Sherman Dale

ENTITLED Universal High-School Training in Illinois as an Objective

BE ACCEPTED AS FULFILLING THIS PART OF THE REQUIREMENTS FOR THE DEGREE OF Master of Arts in Education

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Chapter I

I. Introduction

The high school stands out prominently in the system of public schools not only because of its phenomenal growth but also because of its rapidly growing field for usefulness. It was organized as a preparatory school for college and was largely under church control prior to the Civil War. During this period, it was a select school and only served the wealthier class. Since then the community has been increasingly influencing the high school, with the result that it no longer serves the few who attend college but those, as well, who do not attend college. This precipitated the struggle between the college on the one hand and the community on the other. The one insisting that the high school's function is to prepare for college; the other that it should prepare for life. These influences are still present but the struggle is subsiding and each recognizes the claims of the other. Either influence predominating to the exclusion of the other would be disastrous as long as there are some who go to college and some who do not.

The high school came with the economic revolution brought about by the great labor saving inventions, and the marvelous growth of scientific knowledge. The present conditions require it. It is the product of no man's theories. The complexity of modern life demands a more complete training than the elementary school affords. Every business interest demands it. In every way the influence of the high school is as necessary as it is benign.

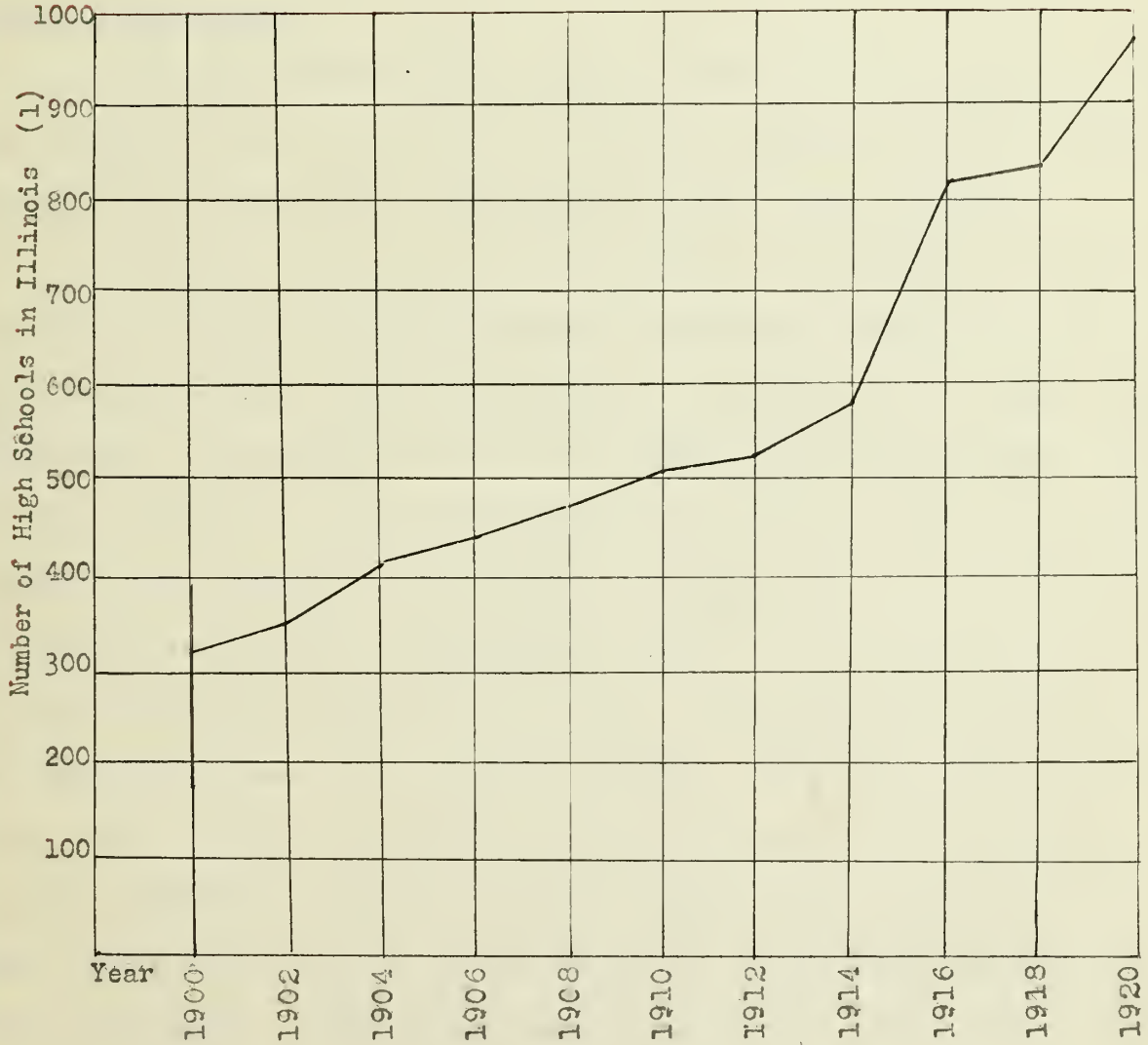
The problem of making the high-school an institution for the masses has been seriously considered for several years. In fact, universal high-

school training has been prominent as an ideal among educators of this country for the past decade. The increases in the number of high schools and in high-school enrollment show that a little advance toward realizing this ideal has been made. The universal high school as we shall think of it, will be the upper four years of a twelve-year state school system, with the courses of study so organized that all pupils, except the feeble-minded, can successfully negotiate at least one of the courses. The universal high-school plant is to be large enough to provide high-school opportunities for all pupils of high-school ages. This twelve-year plan of school organization would make the normal high-school ages 14, 15, 16, and 17, providing entrance at six and allowing for no retardation. The results of this study are based upon compulsory attendance to the age of 18, with provision for earlier graduation by the superior group, and with retardation reduced to a minimum.

The purpose of this thesis is to show what the magnitude of the universal high-school plant in Illinois would be in 1930. The high-school plant for our purpose consists of the number of high-school buildings, in which high schools are operating, and the number of high-school teachers in service.

In our plan of treatment we shall consider first the present size of the high-school plant in Illinois. Following this we shall estimate the size of the universal high-school plant in 1930. And last, we shall interpret the increase in size of the universal high-school plant in 1930 over 1920, in terms of wealth, taxation and teacher-training facilities.

Figure 1. Number of High Schools in Illinois (1)



(1) Reports of Superintendent of Public Instruction.

Chapter II

Number of High Schools

The State Superintendent of Public Instruction issues biennial reports, which contain various facts relative to the high schools of Illinois. These reports for the years 1900 to 1920 contain the data shown in Figure 1.

From this curve we can read the number of high schools in Illinois from 1900 to 1920, and also note the rate of increase of high schools during each biennial period. There are at present 970 high schools in Illinois against 320 in 1900. No distinction is made here between the different types of high schools. The one, two, three, and four-year high schools, as well as the non-recognized, and recognized, are included. The number of high schools has more than trebled in 20 years. The increase from 1900 to 1914 is gradual, but for the biennium 1914-16 the increase is very rapid. The increase during the next biennium,however, shows only a slight increase. If we were called upon to assign a cause for this, we would say, that during this period there were few buildings constructed, partly as a matter of patriotism, and partly due to the almost prohibitive prices of building material. The increase from 1918 to 1920 is very great. A very significant fact is shown by this curve in regard to the rate of increase in number of high schools during the last six years. There have been 400 high schools organized in Illinois since 1914. All of these do not represent new buildings, but some of them now occupying old elementary buildings have voted funds for new buildings, and quite a few have the matter pending.

The high school which meets the standard for the universal high school is one offering a four-year course and is fully recognized by the State Department of Public Instruction. In order to determine the number of high schools in Illinois at present which measure up to this standard, we present on the following page Table I which shows the various types of high schools upon the basis of recognition and length of course.

Table I

High Schools of Illinois[1] 1920
(Classified upon basis of recognition)

	One-year	Two-year	Three-year	Four-year	Total
Non-recognized.....	14	64	4	14	96
Pending recognition...	0	38	37	39	114
Recognized.....	0	7	11	475	493
Probationary recognition.....	0	90	84	93	267
Total.....	14	199	136	621	970
Total per cent	1.4	20.5	14.0	64.0	

(1) Illinois School Directory 1921.

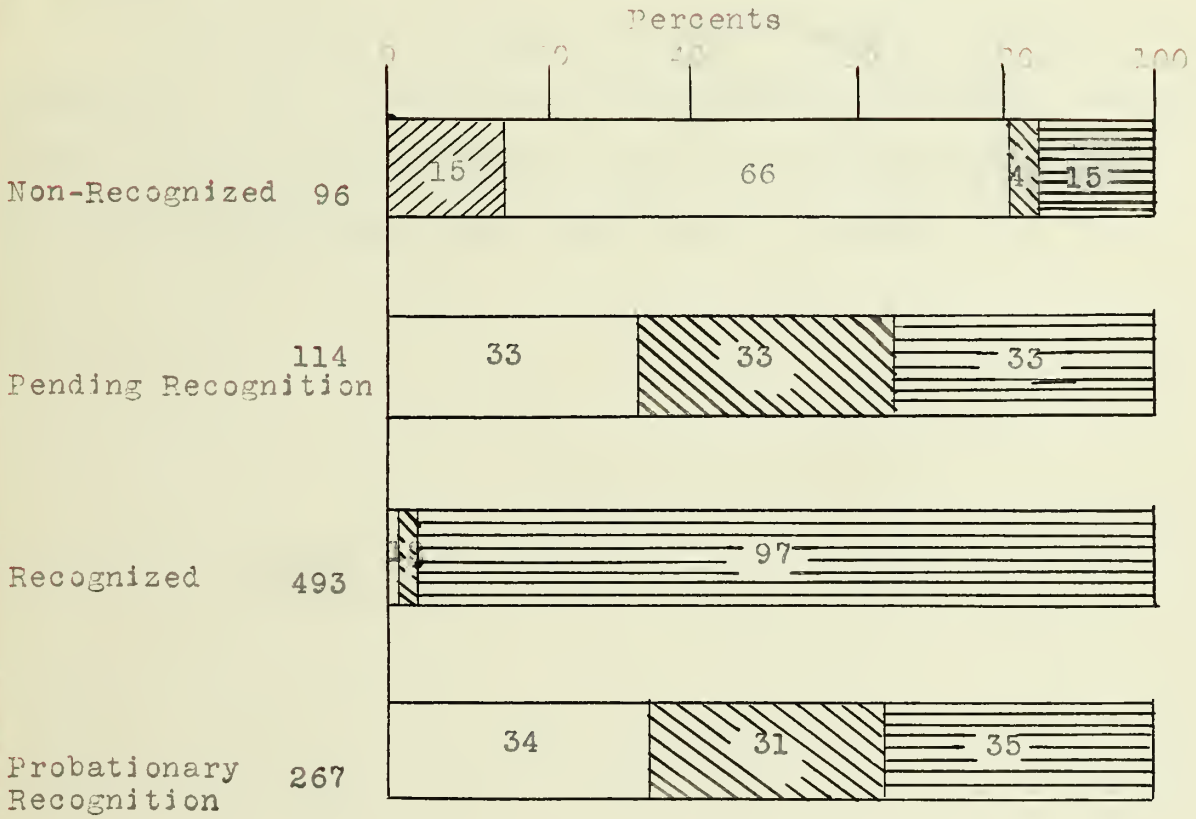
Types of High Schools

Not only the size of the high school plant as expressed by the number of high schools, but also the quality of the high schools as indicated by the classification based upon recognition, is pertinent in this connection.

The Illinois School Directory for the year 1920-21, as published by the State Department of Education at Springfield, is the source of the data contained in Table I and illustrated in Figure 2. This table reveals much concerning the character of high schools in Illinois. There are reported 14 one-year high schools, all of which are non-recognized; 199 two-year, of which 64 are non-recognized, 38 pending recognition, 7 recognized, and 90 on probation; of three-year, 4 non-recognized, 37 pending recognition, 11 recognized and 84 on probation; of the 621 four-year high schools, 14 are non-recognized, 39 pending recognition, 475 recognized and 93 on probation.

These facts show that 349 out of 970, or 35.9 per cent of all high schools in the state are below the standard of a four-year high school, and

Figure 2. Recognition of High Schools



Legend: - One-year High Schools -----

Two-year High Schools -----

Three-year High Schools ---

Four-year High Schools ----

that only 475 out of the 970, or 48.9 per cent, are fully recognized four-year high schools. It is obvious from this table that recognition and length of course go together.

The standard of quality, recognized by the State Department of Public Instruction - that is, a four-year, fully recognized high school- when applied to all the high schools of the state, gives a percentage rating of 48.9, as 475 only out of 970 schools meet this standard of quality.

Table II

Number of High-School Teachers in Illinois[1]

Year	Number of Teachers	Increase	Percent Increase
1900.....	1403		
1902.....	1606	203	14.5
1904.....	1811	205	12.7
1906.....	2057	246	13.6
1908.....	2305	248	12.1
1910.....	2694	389	12.5
1912.....	3040	346	12.8
1914.....	3651	611	20.1
1916.....	4693	1042	28.5
1918.....	5476	783	16.6
1920.....	6218	742	13.6

(1) Biennial Reports of Superintendent of Public Instruction.

Teaching Staff

By comparing the date of Table II with that shown in Figure 1, we find rather close correlation, that is, for the percentage and numerical increases in the number of high-school teachers, there are corresponding increases in number of high schools. This is what should be expected, since an increase in the number of high schools creates a demand for more teachers.

The increase from 1900 to 1914 is very gradual, but for the years 1914 and 1916 the increase of high-school teachers almost doubled what it was in 1912 and in 1914 respectively.

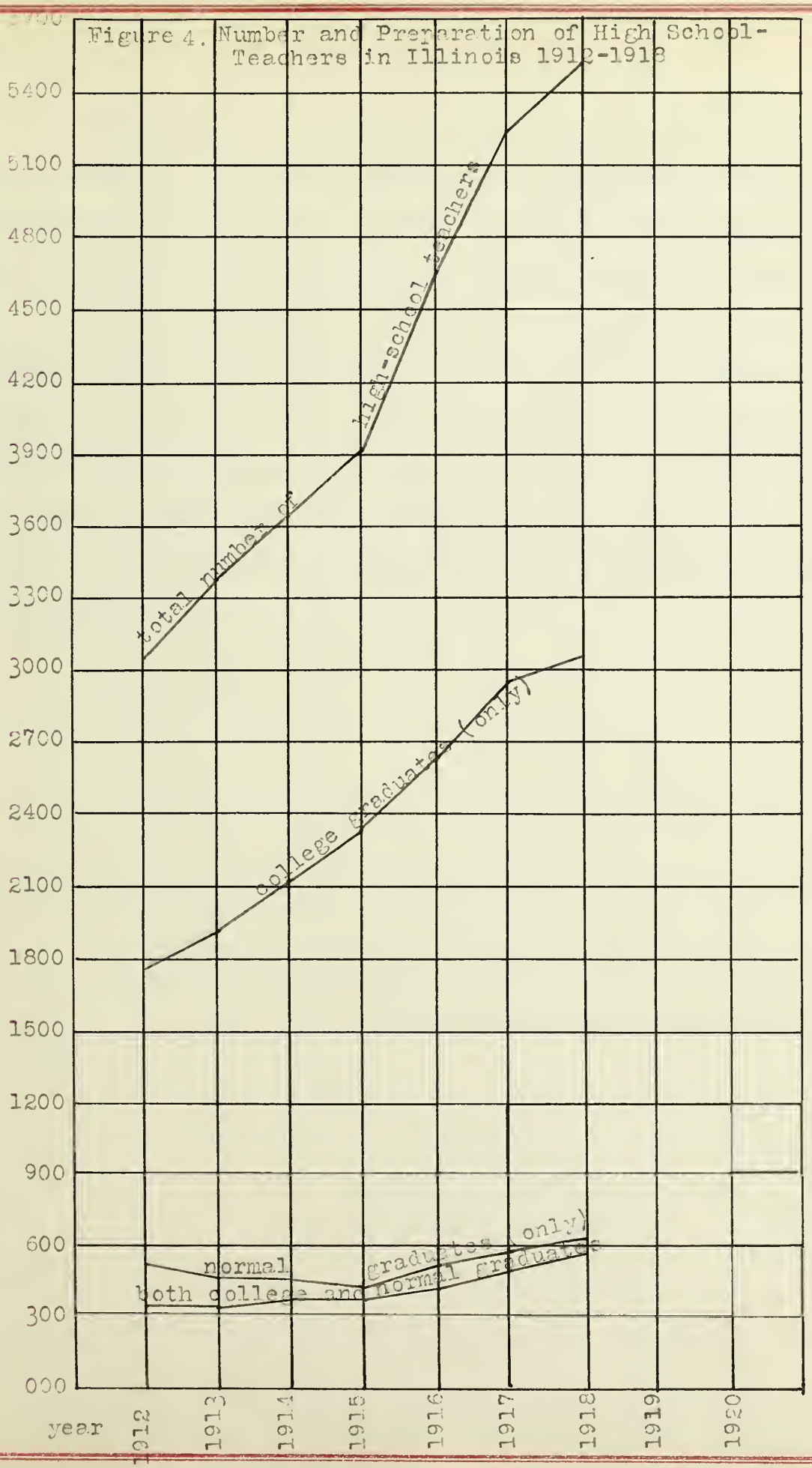
Frequent changes in high-school legislation may account for some fluctuations in increases. For example, the percentage increases of high-school teachers in 1914 and in 1916 of 20.1 and 28.5 per cent respectively may be due to an act of the legislature of 1913 to provide high-school privileges for graduates of the eighth grade, which reads: "That graduates of the eighth grade residing in a school district in which no public high school is maintained, shall be admitted, upon payment of tuition, to any public high school, with the consent of the school board of the district in which such high school is situated. The tuition of such pupils shall be paid by the district in which they reside from any funds not otherwise appropriated, but in no case shall the tuition per pupil exceed the per capita cost of maintaining the high school selected."

There are at present 6218 high-school teachers in Illinois as against 1403 in 1900. The number of high-school teachers has more than quadrupled in twenty years. This very great increase is due largely to the growing popularity of the high school. Of course the total population has increased and to that extent has increased the demand for teachers.

Preparation of Teachers

Not only the number of high school teachers at present in Illinois but their preparation is important. Figure 4 shows the total number of high-school teachers in Illinois from 1912 to 1918, and also such teachers who were college graduates only, normal school graduates only, and the number of graduates of both college and normal. In 1912 there were 3040 high-school teachers in Illinois. Of these 1752 were college graduates only, 531 normal graduates only, and 343 graduates of both college and normal; and in 1918 the total number of high-school teachers was 5476, of which 3051 were college graduates, 627 normal and 566 college and normal.

Figure 4. Number and Preparation of High School-Teachers in Illinois 1912-1918



The significance of this figure is: first, that it shows the rapid increase in number of high-school teachers, especially during period of 1916-1918 inclusive; secondly, that the standard of preparation or training of high-school teachers will be realized when the sum of the "college graduates only" and "both college and normal graduates" will produce a curve which superimposes itself upon the curve showing the total number of high-school teachers; and lastly, that the per cent of college graduates is greatly increasing in Illinois. This is shown by the fact that the curve for the college graduates rises much more rapidly from 1912 to 1918, than does the curve for the normal graduates. Also the percent of college graduates only at present is 68, while in 1912 it was 57.

Table III

Number of High Schools Offering the Indicated Courses(1)

Courses	1912	1913	1914	1915	1916	1917	1918
Academic	528	579	597	595	827	854	840
Commercial	187	181	195	192	352	382	397
Technical	129	116	133	140	217	240	229
Agriculture	54	57	76	86	168	197	205
Dom. Science	107	105	131	150	221	257	280
Normal training	48	43	(a)	(a)	94	112	113

(a) No data
(1) Reports of the Superintendent of Public Instruction.

Courses of Study

Table III shows the latitude of the training offered by the present-day high school, and how different it is from the old classical or college-preparatory high school. The academic or classical course is still the prevailing course as is shown by the fact that practically every high school in the state reports such a course. There are only a few technical high schools in the state where the academic course is not offered.

It is surprising to note that the commercial and technical courses are offered in more high schools than the agricultural course despite the fact that agriculture is the leading industry in the state. This is perhaps due to several causes. First, agriculture is a young science, so far as formal teaching material is concerned. The courses in the agricultural schools have been worked up as new facts have been discovered through experimental research during the last two decades. Second, the notion has been prevalent that formal education

was not necessary for practicing agriculture. This misconception is fast disappearing as is evidenced by the increase in the number of schools offering agriculture. Im 1912 only 54 high schools offered an agricultural course, and in 1918 there were 205, or 280 per cent gain in 7 years. At this rate of increase and with the stimulus given the course by federal aid, agriculture will in a very few years be offered in practically all high schools. Domestic science and normal courses have more than doubled in 7 years.

The magnitude of the high-school plant in 1920 may be briefly summarized, as follows: There are in Illinois 970 high schools,of which 475, or 49 per cent, are fully recognized four-year high schools. The 970 high schools employ 6218 teachers,of which approximately 68 per cent are college graduates. Six distinct courses are offered, the academic, commercial, domestic science, technical, agriculture, and normal training. The order listed here indicated the frequency with which they are offered. In 1918 the academic was offered in 840, or all, of the high schools, the commercial was offered in 397 high schools, the domestic science 280, the technical 229, the agriculture 205 and the normal training in 113 high schools.

Table IV

High School Enrollment in Illinois(1)

Year	Enrollment	Increase in 2-year period	Per cent increase	Enrollment per teacher
1900	38,758			27
1902	41,951	3,193	8.2	26
1904	45,783	3,834	9.1	25
1906	52,394	6,611	14.4	25
1908	56,536	4,142	7.9	24
1910	63,392	6,856	12.1	23
1912	74,568	11,176	17.6	24
1914	85,301	10,733	14.4	23
1916	104,828	19,527	22.9	22
1917	114,441	9,613(b)	9.1	21
1 918	112,559(a)	7,731	7.3	20
1920	127,821	15,262	13.5	20

(a) Decrease from 1917.
(b) Increase over 1916.
(1) Biennial Reports of Superintendent of Public Instruction.

Enrollment

The pupils enrolled in the high schools are not a part of the high-school plant, but are the material to be fashioned and trained. In order to establish the ratios of pupils to high schools or buildings and of pupils to teachers in service, we will present at this time a study of the high-school enrollment in Illinois from 1900 to 1920. In 1900 there were 38,758 students enrolled in the high schools of Illinois. In 1910 there were 63,392 enrolled, an increase of 63 per cent in 10 years. The enrollment in 1920 was 127,821,

an increase of 102 per cent over 1910.

The percentage increase in 1916 over 1914 is 22.9, and this is followed by the 1912 increase of 17.6. The only cause which I can assign for this is that the favorable high-school legislation for the years 1911 and 1915 stimulated enrollment. The decided decrease for the year 1918 over 1916 can be easily explained by the conditions resulting from the world war. Evidence of this is shown by the increase in 1920, which shows a strong recovery from the effects of the war upon high-school enrollment.

The last column gives the ratios of high-school enrollment to high-school teachers in service, biennially from 1900 to 1920. These ratios were obtained by dividing the number of pupils enrolled for the biennial years reported by the number of high-school teachers in service those years.

A very consistent decrease in ratio is shown except for the year 1912 when there was a slight increase. In 1900 there were 27 pupils enrolled in the high schools of Illinois for each teacher in service, and the present enrollment per teacher in service is 20. The significance of this tendency and its consequent effect upon the size of the teaching staff in 1930 will be discussed later.

The ratio of pupils enrolled to the number of high schools, may likewise be found. That is, by dividing the enrollment of any particular year by the number of high schools for that year. In 1900 this ratio was 121. In 1910 this ratio was 124 and at present it is 132. Use of the ratios will be made later when we are estimating the size of the universal high-school plant in 1930.

Chapter III

Size of Universal High-school Plant in 1930.

Problem

The second division of this problem has to do with estimating the size of the high-school plant in Illinois in 1930, if it should be fully operative as a universal high school at that time.

Treatment

In the treatment of this second division we shall use two methods of arriving at our estimate for 1930. The first method will be upon the basis of total population of the state, and the second method will be based upon the first-year elementary school enrollments in 1919 and 1920. The estimate will show the number of persons of high-school age, in other words, the number of pupils to provide high-school opportunities for in 1930.

We must admit that neither of these methods is entirely satisfactory, but by giving proper weight to the various facts and interpreting these facts properly we can estimate rather accurately the elements that will compose the high-school plant in 1930. Both methods are indirect. By the first method, we shall estimate the total population for 1930, and apply to this number the per cent of high-school ages. This will give us the number in the high-school group. The number of high-school pupils in 1930 can then be interpreted in terms of high-schools and teachers.

By the second method we shall start with the first-year elementary school enrollment for 1919-1920 and apply various corrections to this number, in order to arrive at the probable number that will reach the high school before 18 years of age, or will survive to 1930 and constitute the high-school group.

The size of the universal high-school plant depends upon several factors. The first and perhaps the most determining is the present population of the state, its character and composition, and the probable rate of increase in the future. There are,however, certain general aspects of the subject of population, which may have an intimate bearing upon the development of the high school in Illinois as a universal institution. The first of these is the causes of increase.

The natural increase

The natural increase in population is due to the excess of births over deaths. This increase could be easily and accurately calculated if the official reports of births and deaths were available.

One of the oldest and apparently most satisfactory method of calculating the excess of births over deaths is to take the number of those, who, at each decennial census, are found to be less than ten years of age, and subtract the number of deaths during the ten-year period. It is evident, that all those who, in 1920, are found to be under ten years of age, have been added to the population since the census in 1910. The age distribution for Illinois in 1920 is not available from which to determine the number under ten years old, but suppose the increase of ten-year olds to be the same as for the decade 1900-1910, which is 4.7 per cent; we would have 1,197,600 children under ten years of age in 1920; in other words, that number of births during the decade. By applying the mortality rate for Illinois to the population in 1910 it gives about 919,000 deaths during the decade. The excess of births over deaths then would be about 278,000, or approximately 5 per cent increase due to the natural increase of population in Illinois for the decade 1910-1920.

Immigration

Another cause of increase in population is immigration. The number

of foreign-born in Illinois will give us an idea of the extent the factor of nationality enters into the problem.

Illinois, in 1920, had 1,204,403 foreign-born residents, an increase of .2 of one per cent over 1910. This is the smallest percentage increase of any state. This low increase is largely due to the fact that immigration was largely prohibited during the period of war. The fact that 19 per cent of the population of Illinois is foreign born makes prominent the alien and nationality factors.

Illinois is so thoroughly settled, as is shown by the fact that there is on an average 116 inhabitants[1] per square mile. Furthermore, all the features of a frontier population have disappeared; such as, ratio of adults to children, where the ratio is greater than in old thickly-settled territory.

Urban vs. rural

Also the population of Illinois is largely urban. Sixty-seven per cent of the population live in 172 cities and towns of 2,500 or more, while 33 per cent live in towns less than 2,500 or purely rural territory; - that is, not in small towns and villages.

In any complete study of the possibility of realizing universal high-school training all of these factors, and many others, would have to be considered in more detail, but our problem is only to estimate the size of the universal high-school plant in 1930 and hence I will only mention these factors briefly.

Population of high-school ages.

While the total population of the state has a limiting influence upon the high-school enrollment, yet the population of high-school ages has a stronger

(1) The advance census sheets for 1920 gives a variety of facts concerning the population of the various states. The facts reported here were taken from this source.

immediate influence. If we accept the 8-4 plan of organization the normal ages would be 14,15,16, and 17. The United State Census Bureau gives the age distribution of population, and from its reports we can obtain the number of persons in Illinois of these ages for 1900, 1910 and 1920. These numbers and their ratios to the total population will furnish us a means of estimating the number of persons of high-school ages in 1930. It will, however, appear later that some corrections will have to be made due to other factors increasing or decreasing the number to be provided for. Physical defects, intelligence and other retarding influences have been operating upon this group since they first entered school.

Feeble-mindedness

The number of pupils to be enrolled in the universal high school in 1930 does not include the feeble-minded group. Just how large is this group is a question. Terman is perhaps the best authority on the intelligence of children in this country, and he estimates that one per cent is feeble-minded. In our final estimate correction will be made for feeble-mindedness.

Organization

The number of teachers needed for the universal high school is determined somewhat by the method of organization adopted for the high school. For example, the size of the classes into which the school is organized for the purpose of instruction determines largely the number of teachers needed. As was shown on page 16, the ratio of teacher to pupils has increased gradually from 1900 to 1920. There is a notion among school administrators that 25 to 30 pupils per teacher is the maximum number. Their present ratio in Illinois is 20. The results of an experiment just completed in the Illinois city schools by Mr. P.R.Stevenson, indicates that a class of 35 pupils profits as much by instruction, as a class of 20 pupils. If we should accept these results, the number of teachers could be reduced practically one-half and yet not lower the

teaching efficiency of the schools. But in this study we are estimating upon the basis of the present ratio. This and many similar problems would be vital to the ultimate solution of the problem of universal high-school training,but they do not pertain to our problem.

Scheme of instruction

The general scheme of instruction also determines the number of teachers needed. For example, if supervised study was adopted as a part of the recitation with the double-period plan, more teachers would be required than for the single period recitation. There seems to be no widely used plan of supervised study in Illinois high schools at present. For our universal high school we shall make our estimate of the number of teachers needed upon the basis of the single period and without any supervised study plan.

We shall not proceed according to method one, to estimate the size of the universal high-school plant, by estimating the number of high-school pupils to be provided for in 1930.

Figure 6 Percentage Increases in the Population of Illinois.

(Each decennial census on the previous census)

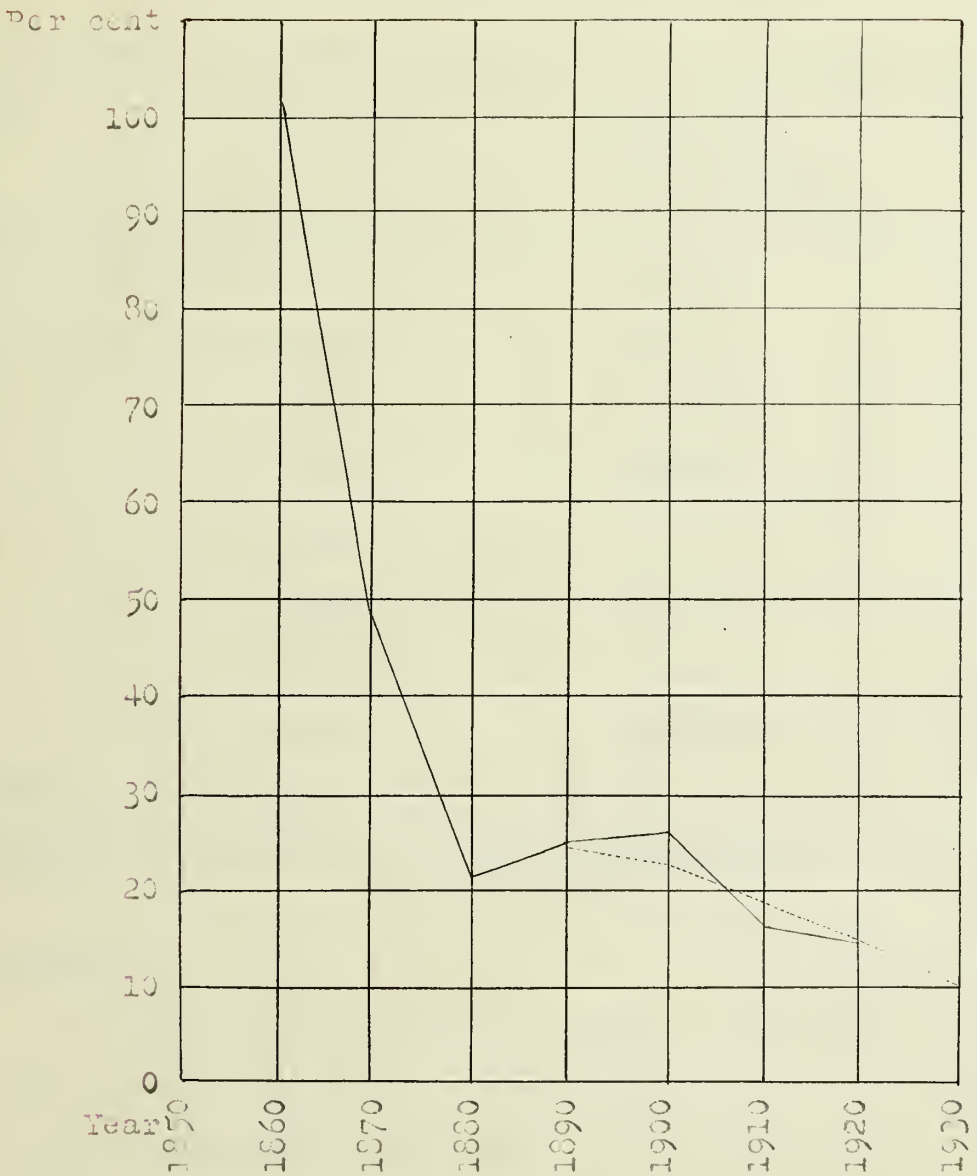


Table V

Population of Illinois[1]

Year	Population	Increase in population for 10-year period	Per cent of increase
1860	1,711,951	860,481	101.0
1870	2,539,891	827,940	48.3
1880	3,077,871	537,980	21.2
1890	3,826,351	748,480	24.3
1900	4,821,550	995,199	26.0
1910	5,638,591	817,041	16.9
1920	6,485,098	846,507	15.0
1930	7,133,808(?)[b]	648,710	10.0 (?)

(1) Reports of U.S. Census.
(b) Estimated by projecting percentage increases as shown in figure 6.

Total population

The total population seems to furnish a ready basis for estimating the number of pupils of high-school ages. Table V shows the population of Illinois, the increase for each ten-year period and the per cent of increase.

In 1860 the population was 1,711,951, or 860,481 more than for 1850, representing a percentage increase for the decade of 101 per cent; while during the succeeding decades the increases were 48.2, 21.2, 24.3, 26.0, 16.9, and 15.0 per cent. A graphical representation is somewhat irregular, but by smoothing the curve representing the percentage increases by decades from 1890-1920 as shown in Figure 6, the curve shows a gradually descending increase, and by projecting this curve to 1930, the percentage increase for the decade will

probably be 10 per cent.

If this 10 per cent increase is approximately correct, we see that the state is becoming rapidly populated or tending toward a static condition, where the death rate equals the birth rate. However, I do not think such a condition will exist in Illinois soon, but as this condition is more nearly approached, social and economic factors which influence the growth of population will be modified, industries will operate on an intensive basis, and the percentage increases resulting will probably be low and rather constant for several decades.

Ny applying the moving average, the curve shown in Figure 6 for the percentage increases for the decades, was smoothed and the resulting per cents obtained 23.8 for 1890, 22.4 for 1900, 19.3 for 1910, and 15.6 for 1920.

These smoothing averages were obtained, beginning with 1890, by adding the 21.2, 24.3 and 26 and dividing the sum by 3, which gave the quotient of 23.8 per cent. For the second average per cent increase, we divided the sum of 24.3, 26.0, and 16.9 by 3, which gave 22.4 per cent. Continuing this until the last term, which was obtained by adding two times the last per cent to the term before the last, and dividing the sum by 3, gave 15.6 per cent. The ten per cent shown in Table VII and in Figure 6 as the percentage increase for the decade 1920-30 was obtained by projecting the curve which passes through these smoothed average points, in the same general direction.

This 10 per cent increase would give Illinois a total population of 7,133,808 in 1930. This total is used in this paper to calculate the increase in population for the ages 14,15,16 and 17. Knowing the population of Illinois for these ages for the year 1900, 1910 and 1920, we can, by applying the percentage increase for the total population, approximate the number of persons there will be of high-school age in 1930, and consequently the number which determines the size of the universal high-school plant.

Table VI

Number of Persons in Illinois Ages 14,15,16,17.[1]

Age	Year			
	1900	1910	1920	1930
14	96,872	107,369	122,401	134,641[a]
15	94,029	100,207	114,236	125,659
16	95,451	111,596	127,220	139,942
17	91,525	108,035	123,160	135,476
Total	377,877	427,207	487,017	535,718

(1) United States Census Reports.
(a) 10 per cent increase over 1920

Persons of high-school ages

The United States Census Reports contain age-distribution tables from which these date were taken. Table VI shows the number of persons of ages 14, 15,16, and 17 (the normal high-school ages) for the years 1900, 1910, and 1920. The number for 1930 was calculated by taking the per cent the high-school age population is of the total population of the state. This per cent was obtained for each of the years 1900, 1910, and 1920. The average of these was found to be 7.5.

Now if the total population of the state for 1930 has been accurately estimated, we may apply this 7.5 per cent to the total population of the state for 1930 and obtain the number of persons of high-school ages in 1930,which is 535,000. This number represents the number of pupils of high-school ages but not necessarily the number that determines the size of the universal high-school plant, as correction will have to be made for feeble-mindedness, and perhaps

retardation and acceleration.

Table VII

Elimination by Death[1]

Age Interval	Deaths Annually Per Thousand	14-year olds	15-year olds	16-year olds	17-year olds
16-17	3.16	------	------	------	99.7
15-16	2.84	------	------	99.7	99.4
14-15	2.56	------	99.7	99.4	99.1
13-14	2.36	99.7	99.4	99.1	98.8
12-13	2.22	99.4	99.1	98.8	98.5
11-12	2.19	99.1	98.8	98.5	98.2
10-11	2.27	98.8	98.5	98.2	97.8
9-10	2.47	98.5	98.2	97.8	97.4
8-9	2.82	98.2	97.8	97.4	97.0
7-8	3.30	97.8	97.4	97.0	96.6
6-7	3.91	97.4	97.0	96.6	96.2

(1) United States Life Tables: 1910, p.16.

The second method of estimating the number of pupils of the normal high-school ages in 1930 is upon the basis of the first-year elementary-school enrollment. This enrollment in 1919 represents the seniors in the high school in 1930. This enrollment in 1920 represents the juniors, and these enrollments in 1921 and 1922 represent the sophomores and freshmen respectively. To these we will apply the mortality rate and calculate the number of pupils of the normal high-school ages.

It is obvious that mortality is a factor or influence that reduces the number of pupils from year to year of any given generation as they advance from grade to grade through the elementary and high school. The problem we have is to calculate the number of survivors from those who enter the first grade of the elementary school when they reach the high school. Table VII was constructed from the census data for the year 1910, contained in United States Life Tables, 1910, p.16. It shows the annual rate of mortality per thousand, and the per cent of survivors of each earlier generation for 14 year-olds, 15 year-olds, 16 year-olds and 17 year-olds.

These annual mortality rates for the ages 6 to 17 inclusive, were derived from mortality conditions prevailing in the area referred to as the original registration states, composing Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Indiana, Michigan, and the District of Columbia.

These mortality rates vary somewhat in different states, but in the long run the differences are so small that for our purpose the average mortality rates for this large area may be used as a standard for comparing the mortality rates of a single state. The method of calculating these rates, and the area covered are sufficient to warrant confidence in their use to mortality conditions in Illinois. Table VII reads that of every 100 thousand children living at the exact age of six, 391 will die before reaching the exact age of seven, and 97.4 per cent of six-year-old children will survive to be 14 years old, 97 per cent 15 years old, 16.6 per cent 16 years old, and 96.2 per cent will survive to be 17 years old.

The first-year elementary school enrollment in 1919 was 180,069, in 1920 it was 182,146. The question arises, how many of these entered school for the first time? How many are six years old? We know the first-year enroll-

ment includes those entering the grade for the first time, those who have been left in it, and are repeating the grade, and those who have been demoted.

Thorndike, Ayres, and Strayer in their studies of elimination and retardation used different methods of estimating the number of the first year enrollment, entered for the first time. Thorndike took the average of the first, second, and third grades. Ayres took the average of the number of ages 7 to 12 inclusive, while Strayer took the largest age-group. The results were approximately the same and indicate that the first-year enrollment is at least 25 per cent too high. To check their results I took the average of the first, second, and third year enrollments in Illinois for 1918, and found this average 22 per cent less than the first year enrollment. The enrollment were for the first year 176,144, second year 122,515, third year 120,354. The fact that there is a difference between the first and second year enrollments of 52,000 proves that there is considerable piling up in the first grade. We shall therefore decrease the first year enrollment by 25 per cent in each case. The true enrollment for 1919 was 135,052 and for 1920 it was 136,610.

Referring to the table we notice that 96.2 per cent of six-year-olds will survive to the age of 17. By applying this per cent to 135,052 we have 129,920 as the number of survivors from the first-year enrollment in 1919, or in other words, these survivors will be seniors in high school in 1930. Likewise for first-year enrollment in 1920, there will be 131,965 juniors in high school in 1930.

We are now confronted with the problem of estimating the first-year elementary school for the years 1921 and 1922 in order to get our starting point for calculating the number of survivors which will constitute the sophomore and freshman group respectively in 1930. The biennial reports of the Superintendent

of Public Instruction for Illinois show a gradually decreasing enrollment for the first year of the elementary school from the years 1914 to 1919, and from this fact we will take the average enrollment for 1919 and 1920 as the first-year enrollment for 1921 and 1922. This average is 135,830 when decreased by the 25 per cent. By referring again to the table we notice that 97 and 97.4 per cent of six-year olds survive to ages 15 and 14 respectively. By applying these percents to 135,830 we have 131,755 and 131,298 survivors from the first-year enrollments in 1921 and 1922, in other words they will be the sophomores and freshmen in high school in 1930. The sum of these survivors is 525,000 or the total number of persons of the ages 14, 15, 16, and 17 in Illinois in 1930. The estimate by method one was 535,000, a difference of 9760. We realize that we have not taken into account the pupils who move in or out of the state between entering school and 18 years of age. Since this data is not available we shall assume that the pupils who move in the state are counter-balanced by those who move out. The results of these methods are close enough to make either acceptable. We shall, however, use the smaller number as a basis for interpreting the possible enrollment in terms of high-school buildings and teachers, and they in turn in terms of wealth and taxation.

Intelligence

Another factor which determines how many of the 525,000 are to be included in the universal high-school group is intelligence. No one will question the statement that there are of high-school age many persons whose mental endowment is such as to exclude them from the high school. What per cent of the present high-school group is mentally defective to this extent is a question. The universal high-school plant is to provide for all except the feeble-minded. Various definitions have been given of feeble-mindedness. According to Terman in The Measurement of Intelligence, all those whose I.Q. is below 70 are feeble-minded. This is of course an arbitrary division, but

it has been rather generally accepted, and we shall apply it to our problem. Terman found that about one per cent of school children have I.Q.'s less than 70, and are for this reason feeble-minded. He also states that with the present organization of curriculums only about 80 per cent could successfully negotiate the high-school course. It is obvious then that a reorganization of the curriculums would be necessary to include 99 per cent; 99 per cent of 525,000 is 519,000.

The question may be raised do all the feeble-minded children enter the first grade? The answer is no. There are many institutional cases. These are not to be found in the first grade, but since parents are slow to recognize mental weaknesses in other children, it is safe to assume that a very large per cent are to be found in the first grade.

Low intelligence is largely responsible for retardation. Retardation would reduce the 525,000, who would be in the universal high school in 1930. We are assuming that elimination of the overaged would be very great at age of 18 when compulsory attendance would be no longer enforced. We are not assuming that all retardation is due to low intelligence, in fact we know it is not, but we will estimate the influence of retardation at this point, rather than attempt to consider it under the various causes which are usually assigned for retardation.

We shall use data for our estimate from Strayer's study of retardation and elimination published in United States Bureau of Education Bulletin 1911, No.5. In this bulletin overageness is shown for 25 cities outside of Chicago. The facts which we shall use are briefly these, that 18 per cent are overage one year, 9.5 per cent two years, 4 per cent three years, and 1.5 per cent four or more years. Now we estimated on page 28 that there would be 132,000 14 year-olds, or of freshmen in 1930. If 18 per cent are overaged one year, then 24,000 of the 14 year olds would be in the eighth grade. If 9.5 per cent are overage two years, 13,000 of the 14 year-olds would be found in the seventh grade. If

4 per cent are overage three years, 5,000 of 14 year-olds would be found in the sixth grade. If 1.5 per cent are overage four years or more, then 2,000 of the 14 year-olds would be found below the sixth grade. A total of 44,000 of the 14 year-olds would be found below the high school. By applying these per cents likewise to the 15, 16, and 17 year-olds, 20,000 15 year-olds, 7,000 16 year-olds, and 2,000 17 year-olds would be found below the high school. A grand total of 73,000 of high-school ages would be found below the high school.

The same source from which these overage per cents were taken also shows that for the same 25 Illinois cities approximately 2 per cent of the pupils are underage, that is, they are accelerated. Since this per cent is so low, and therefore would not greatly change the results, we shall assume that this 2 per cent is one-year under age. Two per cent of 132,000, or the number of freshman age, is 2640. There would be 2640 in freshman year of the universal high school under 14 years old. The net result of correcting for retardation and acceleration, if provision is not made for pupils over 18 years old, is 70,000. Instead of providing a universal high-school plant for 525,000 in 1930, we will provide in our estimates for 455,000.

Chapter IV

Buildings needed

We may now calculate the number of high-school buildings needed upon the basis of the 455,000 pupils to be provided.

At present the ratio of high-school enrollment to the number of high schools is 132 as was shown on page 16. Assuming that a high school is housed in one building, we may then divide the 455,000 pupils to be provided for in 1930 by the ratio 132 and get a quotient of 3447. The universal high-school plant would need about 3450 high-school buildings of the average capacity of the present high-school buildings in Illinois. Of course, the number could be smaller or greater and yet have the same total capacity. It is necessary to estimate the number upon the present size in order to use our information concerning costs of construction, maintenance, etc.

Teachers needed

The other element which constitutes the size of the universal high-school plant is the number of teachers needed. This number may easily be calculated by use of the ratio of the present high-school enrollment to the number of high-school teachers in service. This ratio, as was shown on page 16, is 20. This may be a very low ratio,but since we are not dealing with the needed reorganizations necessary to make feasible the universal high-school, we shall calculate the number of teachers needed by using the ratio 20. By dividing the 455,000 by 20 we will obtain a quotient of 22,750. The universal high-school plant would need about 23,000 high school teachers in service in 1930.

Increase

There are 970 high-school buildings in Illinois at present, and there will be needed 3450 for the universal high school in 1930, with an average capacity of the present buildings, or an increase of 2500 buildings.

At present there are 6218 high-school teachers in service and there will be needed 23,000 teachers to meet the needs of the universal high-school plant. This would necessitate an increase in the teaching force of 17,000 during the next decennium. The big problem of the high school is to provide an adequate number of trained teachers. However, teacher-training is another problem and we shall not consider it.

Table VIII

Growth in Wealth of Illinois[1]

Year	Estimated true wealth (Million dollars)	Increase in 2 yr. period (Million dollars)	Per cent Increase
1902	11,330		
1904	11,913	583	5.1
1906	12,396	483	4.0
1908	13,903	1,507	12.1
1910	14,520	617	4.4
1912	15,484	964	6.6
1914	16,210	726	4.7
1916	16,513	303	1.8
1918	17,331	818	4.9
1920	17,978	647	3.7
1930(?)	22,105	825	4.6

(1) Bureau of Education Bulletin 1920, No. 11.
Reports of State Board of Equalization.

Wealth of Illinois

The financial resources of any industry limit its operation and development, and equally so in the educational industry. Especially is this true of the high school, and for this reason, we submit a brief study of the wealth of the state.

To compute the total wealth of Illinois in 1920 and to estimate its wealth for 1930, I used the following method. From the annual reports of the State Board of Equalization I obtained the total assessed valuation of all property for the years 1900 to 1918

inclusive. Had the law been uniformly obeyed in the matter of evaluating property by the property owners of the state-- i.e. evaluated their property for the assessor at 33 1/3% of its real cash value -- the problem of computing the wealth of the state would have been relatively simple. However, this was not the case, and it became necessary to derive some conversion factor with which the assessed values could be converted into real values. The cue for this was found in Bureau of Education Bulletin 1920, No. 11, Table 60, page 153, which gives the estimated true value of all property for the different states and for the United States.

In this table the wealth of Illinois for 1912 is given as $15,484,450,232, while the assessed value of all property in Illinois for the same year was only $2,343,673,232 or 15.2% of the estimated real value.

Using this percentage ratio as a conversion factor, I changed the assessed value of each year from 1900 to 1918 inclusive into real values, and using these values, projected the data to 1930. For 1920 the real wealth of Illinois is estimated to be approximately 18 billion dollars against 14½ billion in 1910, and in 1930, 22 billion dollars. It is apparent that such data are little more than a good guess, but in the absence of more reliable data, are used generally in all prognostic studies, and so we assume the right to use them for the purpose of this study.

By use of these data, we hope to show the per cent of the total wealth necessary to provide the material plant for universalizing high-school education; the per capita investment based on total population, and other relations which may be pertinent to this study.

John A. K. Keith in the April 1921 number of the Journal of the National Education Association, submits a table on Estimated Valuation of National Wealth for the several states, using the same source material. His estimated wealth of Illinois for 1920 is $20,658,924,827 which he obtained by adding the increase for the 8-year period 1904-1912 to the estimate of 1912 as made by the Bureau of Census, and reported in Bureau of Education Bulletin 1920, No. 11 referred to above. This would indicate that my estimate for 1920 is very conservative, being more than 2 billion dollars less, and if the same method as used by Keith were applied as to 1930, the estimated wealth would be more than 27 billion against my estimate of 22 billion. This comparison lends conservative qualities to this table. My conviction, however, is that a median estimate would be more accurate.

Table IX

Investment and Current Cost of High Schools in Illinois in 1917 per Pupil Enrolled(1)

Investment		Current Cost			
Kind	Building, Site and Equipment	Maintenance	Operation	Instruction	Total Current Cost
City High School.....	$278.08	$2.41	$2.21	$37.64	$42.26
Township High School	409.29	5.22	4.53	53.28	63.03
Average.....	$343.68	$3.81	$3.37	$45.46	$52.64

(1) Based on study of 156 to 423 high school reports by Lewis W. Smith, 1917.

High-School Costs.

The purpose of this table is to show the permanent and current costs of high school education per pupil enrolled in the high schools of Illinois.

Incidentally this table shows some interesting comparisons of costs of high school education in the city high school and the township high school. The township high schools in every case have more money invested in buildings, sites and equipment than the city high schools. The maintenance, operation and instruction costs are also greater in the township high schools. The study referred to shows that the township high schools are more completely equipped in every particular than the city high schools, except one, namely, the library.

This larger expenditure both in investment and current

costs on the part of the township high schools, is the direct outgrowth of two features in the township high school organization, which characterizes it as a unit of school administration. In the first place, the township high school is organized to cover a wider range of territory than the ordinary high school district, thus providing a wider basis of taxation and allowing a larger accumulation of funds. The greater resources thus provided enable the school authorities to invest larger sums of money in the plant and to give more adequate financial support to maintenance, operation and instruction.

In the second place, one other factor which may have a definite bearing to produce this greater expenditure by the township high schools is the fact that generally the board of education and the principal give special attention to this one unit of our school system, whereas the conventional school district with a system extending from the elementary grades through the high school, has a board of education and superintendent whose attention is diffused over the entire system.

This larger investment and current cost of the township over the city high school are possible on account of the dual system of taxation, by which the township or community high school may levy for its purpose, as much as is levied on the same property for elementary school purposes. This discriminates against the city high school unless it is operated as a community or township high school. Efficiency as well as justice demands that every high school whether township, community or city, have equal powers of taxation, in order that they may have the same per capita support. If we consider the $343.68 the per capita investment in high school

property per pupil enrolled, the wealth of the state so invested in 1920 was $44,678,000.

Building costs

We can now estimate the construction and equipment cost of the universal high-school plant upon the basis of number of buildings. If 970 high-school buildings and equipment cost 45 million dollars, 3450 of the same quality and capacity would cost, at the same time 3.6 times as much, or 160 million dollars. The increase in permanent costs, therefore, to build and equip the universal high-school plant, would be 120 million dollars.

It is a simple matter to determine what per cent this amount is of the total wealth of the state given in Table VIII. The wealth invested in high-school buildings at present is .0024, or slightly in excess of 2/10 of one per cent. If the state should provide universal high-school plants by 1930 the per cent so invested would only be .0054, or 5/10 of one per cent of the total wealth of the state in 1930.

In order to obtain funds to provide the additional plant for the universal high school, the state would need to levy a single tax for one year of 5.4 mills upon the true value of all the property in the state, or 11 mills upon the assessed value. (The assessment value was 25 per cent of the true value prior to 1909. In 1909 the law required that the assessed value should be 33 1/3 per cent of the true value. At present the law requires that the assessed value be 50 per cent of the true value).

The 160 million dollars needed to enlarge the present high-school plant into the universal plant is less than what was appropriated at the last session of the Illinois legislature for all state purposes.

Teachers

Since we have calculated the construction cost upon the bases of 1917 data, for consistency we shall use the 1917 data for calculating the current

cost. By referring to Table IX we see that the total current cost per capita is $52.64. Upon this basis the annual current cost of the universal high school in 1930, with its estimated enrollment of 455,000 pupils, would be 25 million dollars.

Chapter V

Summary.

The salient facts which have appeared in the preceding discussion are: that 970 high-school buildings valued at 45 million dollars, now house 128,000 pupils, who require the services of 6200 teachers.

But in 1930 it is estimated that the population of Illinois will be slightly over 7 millions,and of these, 525,000 will be of high-school age. Furthermore, 70,000 of the 525,000 will not be in high school in 1930, with the normal age group,on account of retardation and acceleration. To provide a universal high-school plant for the 455,000, it would require 3450 high school buildings, with an estimated value of 160 million dollars, or 7.3 mills in each dollar of the true wealth in 1930. The current cost for the schools designed to care for the entire 455,000 pupils would be about 25 million dollars per year (on the basis of $52.64 per pupil), or 1.1 mills in each dollar of the true wealth in 1930.

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